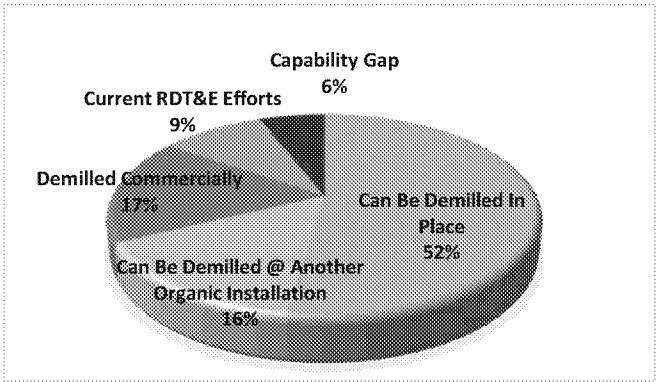
2.3 Organic Industrial Base Capabilities

The Demilitarization Enterprise currently analyzes the Top 400 DODICs within the B5A stockpile. As of the end of fiscal year (FY) 2016, the Top 400 comprises 390,162 short tons, or ~83% of the total B5A stockpile. The current Top 400 DODIC strategy is broken into five primary demilitarization categories:

- Can Be Demilitarized in Place at Organic Location
- Can Be Demilitarized at Another Organic Location
- Can Be Demilitarized Through Commercial Contract
- Current RDT&E Efforts
- Capability Gap



Can Be Demilled in Place at Organic Location are those items that can be demilitarized at the current storage location. For example, Crane Army Ammunition Plant (CAAA) can demil the D563 155MM ICM projectile, so this item would show up here.

For those items which *Can be Demilitarized at Another Location*, but not at the current storage site, they are shown in another category. An example of this, again, is D563 at Bluegrass Army Depot (BGAD). Bluegrass cannot demil the item, but other installations like CAAA can demil them.

Demilled Commercially entails those munition items currently planned for commercial demil execution. Oftentimes, these are munitions where an organic capability doesn't exist or when it is more economical to demil commercially to maximize capacity.

Our capability gaps, or munitions where a current capability doesn't exist, is broken into two categories: *Current RDT&E Efforts* and *Capability Gap*. The reason these munitions are separated into two groups rather than one is because the Demil Enterprise has already begun efforts to develop capabilities for some of the munitions. This allows Government, Industry, and Academia to better understand what munitions are already being analyzed, and what items the Demil Enterprise still needs technological advances for developing a capability.

Within the Top 400, the Enterprise can demilitarize approximately 335 DODICs either through the organic base or utilizing our industry partners. This equates to 330,598 short tons. The Demil Enterprise employs many different capabilities to accomplish the demilitarization mission. These capabilities include, but are not limited to: metal recycling and recovery, explosive recovery and reuse, incineration, chemical conversion, chemical destruction, open burning, and open detonation. A brief description of explosive demilitarization and disposal capabilities are discussed further below.

a. Open Burn. Open Burning (OB) is a Resource Conservation and Recovery Act (RCRA) regulated hazardous waste treatment process used for disposal of bulk propellants, reclaimed high explosives and combustible materials contaminated with energetic residues from ammunition and ordnance manufacturing processes that cannot be safely disposed of through other means. Open burning is generally conducted using steel pans sitting on concrete pads to avoid contact with the surface soil. The burn pans have sufficient depth and size to contain treatment residues during combustion and are kept covered when not in use. During OB operations, the energetic material is allowed to burn in the open air until exhausted. The ash is recovered and normally disposed of as a hazardous waste.

b. Open Detonation. Open Detonation (OD) is a RCRA regulated hazardous waste treatment process that disposes of reclaimed high explosives that cannot be reused, large explosively loaded cased ordnance, ordnance components (e.g., primers and fuzes) and certain detonable rocket motor propellants that cannot be safely disposed of through other means. Open Detonation is generally performed by strategic placement of sympathetic explosive donor charges on the ground, in buried or uncovered pits adjacent to waste explosive ordnance and detonated in the open air. As the detonation event proceeds, energetic materials are spontaneously combusted in the resulting fireball which produces heated off gases that rise and pull soil into a visible plume.

c. Static Fire. Static Fire (SF) is a RCRA regulated hazardous waste treatment process that disposes of missiles and rocket motors that cannot be safely disposed of through other means by igniting them in stationary stands or pits that allow for optimal oxygen-fuel mixing during open air burning. Static firing is a form of OB that can be performed with the nozzles either attached or removed. Removal of the nozzle during static firing has been shown to help decrease internal pressures that build up during motor firing. Rocket motors that cannot be safely fired from stationary stands or pits can be processed by using linear shape charges to simultaneously access the motor case and ignite the energetic materials housed within. After SF processing, the spent motor cases are allowed to cool and inspected for residues before final disposition.

d. Rotary Kiln Incineration. Two primary incinerators exist within the organic base (APE 1236 and the RF-9). The APE 1236 is an explosive waste rotating incinerator with afterburner and baghouse located at the discharge end. It was developed specifically for conventional end-item munitions. The incinerators have feed rates for burning of certain propellants, explosives, and pyrotechnics (PEP). The type material determines the actual feed rate. The weight of the material processed is not limited to the net explosives weight (i.e. it includes other materials, such as metal parts).

e. Flashing Furnace. This system thermally decontaminates materials to be considered as "Material Documented as Safe" so they can be sent to metal recyclers. In some cases, up to 10,000 pounds of contaminated metal can be flashed per hour. When flashing contaminated metals, furnace emissions are typically below the *de minimis* levels established by most states, and operations require no permits.

f. Autoclave Meltout. Explosive melt-out process is performed by utilizing steam jacketed autoclaves that melt the explosives; heated steam does not come into direct contact with energetic material. As the explosive is melted from the projectile or bomb, it collects in a common manifold system and is deposited into a vat separator. The different materials separate into layers and are drained to respective collection sites. The flaked energetics are then placed into boxes and can be reused. The water is recaptured and re-circulated through an ethylene glycol chiller for reuse. Wet scrubbers control particulate matter emissions from the melt-out process. All empty projectiles, casings, and bomb bodies, are disposed of as scrap metal.

g. Water Washout. Water Washout is an energetic removal process that is used to remove a wide range of energetic materials from a variety of sizes and configurations of cased munition items. The process normally employs the use of an array of rotating nozzles and varying levels of high-pressure water to liberate and remove energetic materials from cased munition bodies that have already been accessed. The removed bulk energetic material is then collected for reuse or for further chemical separation and processing. The energetically contaminated washout water is also contained and collected before being recycled or treated through secondary waste stream treatment processes before final release to the environment.

h. White Phosphorus to Phosphoric Acid Conversion (APE 1400). Approximately 480 lb. of white phosphorus (WP) is processed per hour. During operation, the munitions are unpacked and checked to ensure that no burster tubes remain in the munition. As a pre-processing step, the WP is accessed prior to feeding into the kiln to allow for a complete burn. The feed appliance has ducts and a feed chute to the APE 1400 furnace. Gas enters the ducts, which feed the hydrator, where the smoke is hydrated to make phosphoric acid. The acid travels into a tank, heat exchanger, and density cell prior to returning to the hydrator. These steps repeat until the acid reaches 75% concentration, at which point a valve opens and streams the acid into the acid storage tanks.

i. Explosive D Conversion to Picric Acid. Explosive D is soluble in water so high-pressure washout dissolves the explosives material in a few minutes. The process involves cutting the base plate with a water jet, washing out the explosive, inspection, cutting the nose fuze, and an additional 200% inspection. All cutting and washing steps are completed remotely. The process has been demonstrated with 5", 6", and 8" rounds. The chemical plant converts Explosive D-contaminated water from the wash-out process into picric acid, which is used in leather tanning and the extraction of iron ore. Approximately 10,000 lbs of picric acid are produced per week. The picric acid production provides cost avoidance by preventing environmental issues and storage costs.

j. Hot Gas Decontamination Facility. Processes explosives-contaminated materials from an initial "trace explosives-contaminated" to a final "releasable to the public" condition. Each item is inspected prior to storage and processing at the facility to ensure only trace amounts (or less) of explosives are present. This system utilizes a thermal decomposition technology to remove energetic residues from equipment, scrap metal and debris to concentrations below detection limits. It consists of a decontamination chamber, thermal

oxidizer, heat exchanger/cooling system and control system. The items are first loaded by cranes onto a chamber rail car and then pushed into the decontamination chamber which is sealed during treatment. Decontamination is achieved by treatment with a high temperature air stream (approximately 1,200°F) for a long duration. When decontamination is complete, the chamber rail car is allowed to cool. The explosives limit for the decontamination chamber itself is 5 lbs. Net Explosive Weight (NEW) of Hazard Division (HD) 1 .1. This limit is based solely on available distance, not on the most probable NEW expected at the decontamination chamber.

k. Base Hydrolysis. The base hydrolysis system is a chemical destruction process that uses a bath of strong alkali chemicals (NaOH) to simultaneously access aluminum bodied CADs/PAD munition items and chemically decompose (hydrolyze) energetic materials housed within. The resulting water soluble chemical waste streams generated through the process are then collected and disposed of as a hazardous waste material.

The table below shows where each of these capabilities are currently located throughout the organic industrial base.

Organic Capabilities (Processes)	Organic Location						
	MCAAP	CAAA	HWAD	ADMC	TEAD	LEMC	BGAD
Open Detonation	A	A	A	A	A	A	A
Open Burn	A	A	A	A	A	A	A
Static Fire	A			A	A	A	
Rotary Kiln (APE 1236 or RF-9)	A	A	A		A		
Flashing Furnace			A	A			A
Autoclave Meltout	IO		A				
Hot Water Washout			A				A
APE 1400 White Phosphorous to Phosphoric Acid Conversion		A					
Explosive D Conversion to Picric Acid		A					
Hot Gas Decontamination System			A				
Base Hydrolysis					A		

Legend:

A. Active and Currently Operational Capabilities (Processes)

IO. Inactive but Fully Developed Capabilities (Could be operational with limited effort)